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Electronic Business®

FOR MANAGEMENT IN ELECTRONICS, COMPUTER & SYSTEMS COMPANIES — WORLDWIDE

MAY 28, 1990

SPECIAL REPORT

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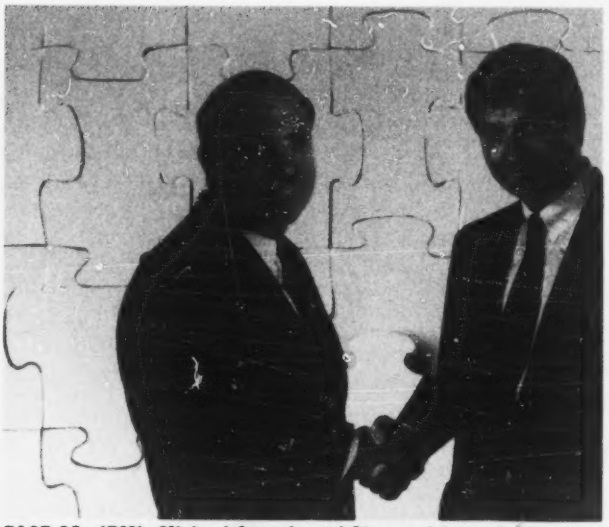
Michael Attardo, IBM vice president, left, and Juergen Knorr, Siemen executive vice president

Electronic Business

FOR MANAGEMENT IN ELECTRONICS, COMPUTER AND SYSTEMS COMPANIES — WORLDWIDE

VOL. 16, NO. 10 MAY 28, 1990



PAGE 32 IBM's Michael Attardo and Siemens' Juergen Knorr: They became partners to help restore a global balance in DRAM markets

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Should your company consider a strategic alliance? "Yes!" say IBM, Siemens, DEC, AT&T, TI, Hitachi, SGS-Thomson, Philips Signetics and Varian. U.S. electronics executives from large and small companies alike are learning what their European and Japanese counterparts have known for years: When it comes to developing, managing and marketing fast-moving new technologies efficiently, the strategic alliance has a compelling attraction.

Cover: Michael Attardo photograph by Jeffrey Vock. Juergen Knorr photograph by Thomas Mayer/Black Star. Puzzle produced by Draw the Line Production. Puzzle photograph by Dave Bradley.

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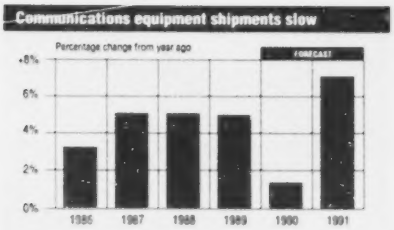

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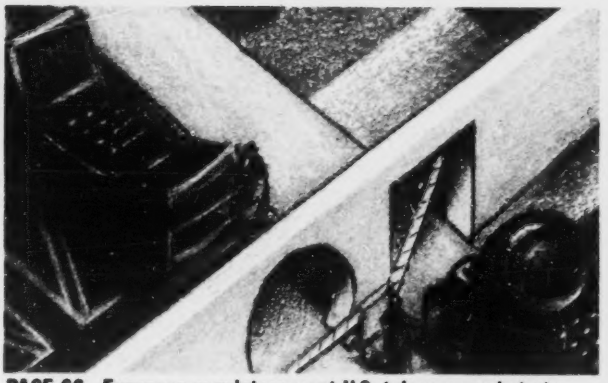

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Marshall Industries: quiet profits

On the surface, 70-year-old Gordon Marshall is an imposing figure. Besides wearing the hats of chairman, president and CEO of the $533 million distribution company he founded in 1954, Marshall stands some 6 feet 4 inches tall.

But to be imposing is not Gordon Marshall's way at all. He's a quiet man who directs a quiet, well-run company that truly *does* put the customer first.

During a recent visit to his company's Area Service Center in Wilmington, Mass., Marshall addressed about 70 of his troops for a pep talk. Assistant editor Barbara Jorgensen, who examines the El Monte, Calif.-based company in this issue, says so quiet is the man that he had to be reminded several times to speak louder.

While it is not Gordon Marshall's way to create a ruckus, the message he had for his employees speaks volumes about why the company is one of the most profitable distributors around. "You're on fire here," Marshall told the workers. "The whole company is on fire. And as long as we take care of the customer, he or she will be comfortable doing business with us."

The primary reason for Marshall Industries' success is clear: customer service. Sure, there are other key bottom-line factors such as varied products and cost-control measures, but it all stems from, as Gordon Marshall says, taking care of the customer.

Our story on Marshall will be one of many we'll report this year on distribution companies. Jorgensen, our former copy editor, is our new full-time distribution writer. She would welcome hearing your story ideas.

Barbara Jorgensen, assistant editor

Call her directly at (508) 558-4575. She also covers consumer electronics.

Strategic alliances

Whether it is IBM-Siemens or Texas Instruments-Hitachi, companies across the globe are banding together in an effort to manage fast-growth technologies.

Contributing editor H. Garrett DeYoung and Dwight Davis have collaborated in this issue to present a comprehensive examination of strategic alliances. Their cover story is must reading, especially for companies that might be going the same route in the future. DeYoung offers an overview of the why's and how's of strategic alliances, while Davis takes a specific, case-study look at five such unions.

MARVIN GREENE, section editor

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VBPA ABP

UNIX

Two sides stake out positions after Unix merger talks break off

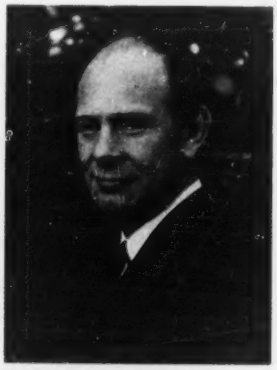
COULD THE END of the Unix merger talks be a blessing in disguise?

While the cessation of the negotiations between the Open Software Foundation (OSF) and AT&T and its Unix International advisory group ensures two major versions of Unix for some time to come, ending the uncertainty about the operating system's future could actually boost acceptance by industry.

"There was a long period of angst," says Nina Lytton, editor of the Boston-based *Open Systems Advisor* newsletter, of the talks that began last November. "Now there is no uncertainty about the two choices. I think it's going to create a speedup in industry acceptance of Unix."

Others are not quite so upbeat. "The future doesn't look as bright as if the two groups were working together toward a common goal," says Maggie Konner, Unix research manager at International Data Corp. in Framingham, Mass. But she concedes: "I don't think it's a disaster that negotiations have broken off."

Unix International's Sandel: AT&T's system is the "only version out there"



OSF's Tory: "OSF is strategically important to the industry"

Refusing to provide details, executives from both camps cited disagreements over "structural and organizational issues" as the sticking point in the negotiations.

"We agreed that it would not be appropriate for the organizations to merge right now," says David Sandel, Unix International vice president of worldwide marketing, Parsippany, N.J.

But David Tory, OSF president and chief executive, says AT&T's refusal to agree to equal ownership of Unix or other OSF demands, such as early and equal access to software specifications, forced the stalemate.

The talks, however, did produce a number of agreements on more technical matters, such as adherence to such established standards as Posix and X Windows and agreement to support standards adopted by the X/Open Co. Ltd.

While a jointly issued statement played down the differences between the two groups, executives from both sides quickly sought to stake out the leadership position in the Unix industry.

Lytton says one result of the end of the merger discussions is that the industry must accept Cambridge, Mass.-based OSF as a long-time player, rather than a short-term bargaining chip in the major computer vendors' tug of war with AT&T.

"OSF is strategically important to the industry and to the members and organizations that support it," Tory says. He maintains that OSF/1, the Unix-based operating environment OSF plans to debut sometime next year, is gaining industry acceptance.

OSF backers IBM, Digital Equipment Corp., Hewlett-Packard Co., Groupe Bull and Hitachi Ltd. have pledged to ship OSF/1 with their computers sometime in 1991. Those same companies are also increasing their financial support for the consortium, although the dollar amounts have not been disclosed.

Unix International's Sandel argues that it is AT&T's Unix System V that is gaining wide industry acceptance. "Today there is only one version [of Unix] out there," he says, adding that Release 4.0 of System V has begun shipping — in contrast with OSF/1's 1991 scheduled availability.

Another possible silver lining to recent events is that both sides can now pursue research and development free from any distractions caused by the negotiations. Although Sandel maintains that the talks did not hinder AT&T's Unix efforts, Tory acknowledges that breaking off the discussions "will allow OSF to focus on technology development."

RICK WHITING

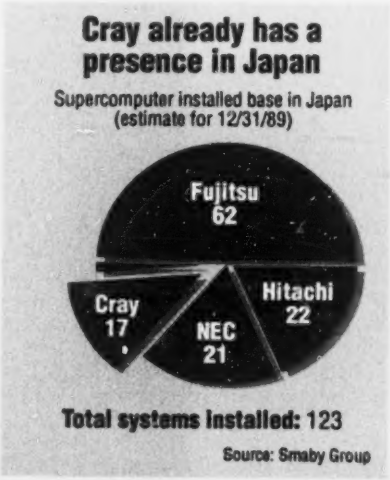
SUPERCOMPUTERS

Cray's maneuvers aimed at Japan

THE RECENT TRADE agreement between the United States and Japan means dollar signs to the world's biggest supercomputer maker, Cray Research Inc. Minneapolis-based Cray is moving decisively to capitalize on the agreement that will open up the Japanese government market to U.S. technology firms. Cray already has a considerable presence in Japan's commercial marketplace.

Cray chairman and CEO John A. Rollwagen projects that the trade agreement, if it's implemented properly, could boost his company's sales to the Japanese government by $100 million a year.

Rollwagen says Cray has been developing low-end machines, targeting



Japanese government agencies and academic institutions.

Cray's recent decision to acquire Supertek Computers Inc. of Santa, Clara, Calif., fits those plans. Supertek's $250,000 minisupercomputer, the S-1, is already compatible with Cray's old X-MP line. Cray plans to make the relatively low-powered system compatible with its newer Y-MP line by employing the Unix-based operating system UNICOS to enhance performance.

Debra Goldfarb, an analyst at International Data Corp., says despite the trade agreement, obstacles remain in Japan for Cray. "The major Japanese vendors can provide their end users with big discounts," she says. "They still have the ability to underprice U.S. manufacturers." The discount by some Japanese supercomputer vendors can run as high as 80%.

More optimistic, analyst Gary Smaby of Smaby Group in Minneapolis, notes, "Cray is doing exceptionally well in the commercial market in Japan in terms of installed base. Cray has obtained quite a visible market share in Japan, whereas Japan has only one system installed in the U.S." Cray has 17 X-MP and Y-MP systems installed in Japan, while Supertek has sold six S-1 systems there.

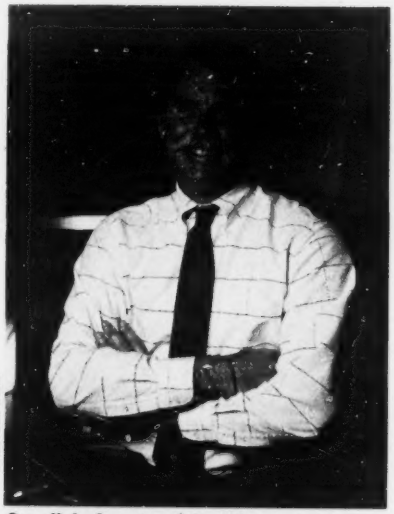
XIONG XIAOGE

GOVERNMENT

DARPA head reassigned, but Gazelle collects cash

IN A SURPRISE MOVE late last month, Dr. Craig Fields, for the past year head of DARPA, the Pentagon's research and development agency, was demoted. Fields was transferred to a deputy research position in the Defense Department. The Pentagon's decision to remove Fields came shortly after a decision he had made to invest $4 million in Gazelle Microcircuits Inc., Santa Clara, Calif., leaving defense contract watchers to wonder whether there was any connection between the two moves.

Apparently the Gazelle deal has not been jeopardized by Fields' transfer. The investment in Gazelle was a first for the Defense Advanced Research Projects Agency, which



Linda Sue Scott

Gazelle's Crowley: $4 million in venture capital from DARPA

controls more than $1 billion a year in R&D funds for defense-related projects. Last November Congress enacted legislation that set up a two-year, $50 million project designed to allow the federal government to protect leading-edge technology it had funded from being sold to foreign companies.

Gazelle has already received and is using its investment, which was to provide working capital. The privately held company manufactures chips from gallium arsenide, a technology that is being developed for its faster-than-silicon speeds. The investment was also earmarked for further development costs of a 1-gigabyte-per-second data communications transmitter and receiver chipset, the Hot Rod.

Gazelle chairman and CEO Jerry R. Crowley expressed puzzlement over Fields' reassignment, noting that the entire investment process had been authorized by Congress and had received complete federal approval. Under the new legislation, DARPA was authorized to form cooperative agreements and take a direct equity position, which it did in April with Gazelle. In addition, DARPA's status as an investor allows it to veto any sales of Gazelle technology to foreign countries for three years, an issue that Fields had adamantly insisted on, Crowley notes.

In the past Gazelle has received investment capital from Nippon Mining Co. Ltd., Techno Ventures and Nomura Securities, Crowley says.

In addition to protecting sensitive technology, another industrial policy issue at the center of the new legislation is the Bush Administration's stance on direct government funding of industry. Proponents reasoned that the government should be able to receive a direct return on investment from DARPA's R&D grants; for example, the DARPA-funded project Ethernet was an enormous commercial success, yet the government received nothing. "The idea is to cut through bureaucracy and get crucial technology funded, but with an ROI for the government," Crowley observes.

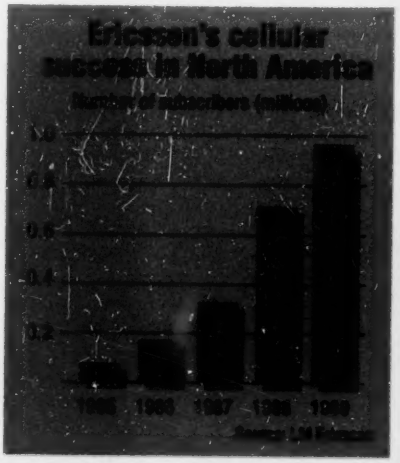
Still undecided is whether the agency will take its eventual share on royalties on Gazelle products developed under the project or payment on appreciation of company stock. Industry had hailed the DARPA project as a venture capital source for U.S. start-ups that does not have strings attached to technology transfers outside the United States.

TERI SPRACKLAND

EUROPE

Ericsson's departing CEO still loves America

AT HIS EIGHTH and final annual European press conference before handing the reins of LM Ericsson to his successor, president and CEO Bjorn Svedberg reiterated the company's commitment to the U.S. market as a new source of profit growth



TRADE

U.S. logs first information technology trade deficit

THE U.S. INFORMATION technology industry turned in poor trade results in 1989, reporting a deficit for the first time in the three decades that statistics have been kept. At the same time, the broader category of all electronics posted a trade deficit in 1989 virtually unchanged from 1988.

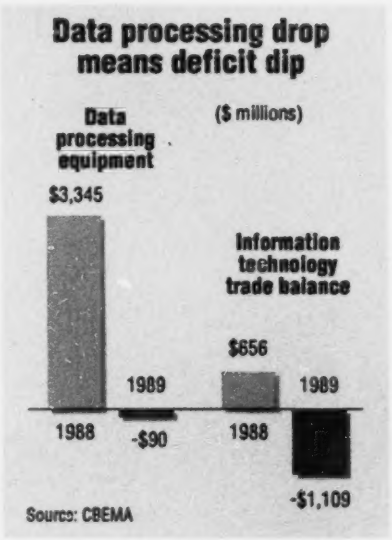
The trade balance for the information industry — defined as business, data processing and telecommunications equipments and parts — plummeted from a $656 million surplus in 1988 to a $1.1 billion deficit last year, reports the Computer and Business Equipment Manufacturers Association (CBEMA). Figures for January 1990, however, point to an improving trade picture. CBEMA reports a January trade surplus of $19 million for information technology, up from a $135.1 million deficit in January 1989.

The sharp drop was caused primarily by a falling trade balance in data processing equipment. From a 1988 surplus of $3.345 billion, the data processing equipment balance fell to a $90 million deficit in 1989. CBEMA is unsure why the trade balance fell so sharply but Helga Sayadian, a CBEMA analyst, speculates the reason is rooted in stagnant exports and rising imports. Other contributors include a rising U.S. dollar and increasing U.S. offshore manufacturing, she says.

On the brighter side, the trade deficit in business equipment and telecommunications equipment narrowed in 1989, according to CBEMA. The balance in business equipment improved by $426 million from a $3.113 billion deficit in 1988 to a $2.687 billion deficit in 1989. In telecommunications the deficit fell by $1.4 billion from $2.391 billion in 1988 to $960 million in 1989.

The only category of information technology that held on to a surplus last year was data processing parts. From $2.082 billion in 1988, the data processing parts surplus rose by 6.9% to $2.226 billion last year.

In aggregate, the total U.S. electronics trade deficit increased 0.2% in 1989 to $9.6 billion, according to the American Electronics Association. Total exports for the year were up 6.8% to $62 billion while imports rose 5.9% to $71.6 billion. Canada imports more electronics from the United States than any other countrys while Japan exports the most electronics to the United States. □



EMPLOYMENT

Employment rebound expected in late '90

AFTER CONTRACTING IN 1989, U.S. electronics employment will remain sluggish through most of this year. A mild employment upturn will begin in the fourth quarter and carry through 1991 as the industry moves into a steady recovery mode, according to Cahners Economics. Electronics employment will contract by 1.5% this quarter over last quarter.

Employment in the computer equipment and components segments, including semiconductors, is expected to remain sluggish throughout much of the year. Computer equipment will post its first gain in the fourth quarter of just 0.9%, while components won't start to show signs of a labor recovery until the second quarter of 1991.

"It's all part of the lean-and-mean trend in high technology," says economist Madeline Franchi of Cahners Economics. Even as corporate revenue rises this year, productivity-enhancing changes in factories and offices will keep payrolls in check.

In total, the electronics industry lost 20,000 jobs during 1989, from 2.6 million at the end of 1988 to 2.58 million by December 1989, according to the American Electronics Association. The biggest losers were consumer electronics, and the biggest winners were in software. □

SHIPMENTS

Rising shipments: Sign of a recovery

ACCORDING TO the U.S. Department of Commerce, shipments for all electronics hit $23.3 billion in February, 1990, 10.6% above last February's figure. At the same time, new orders for electronics were up 8.6% for the month over February 1989.

For the most part, the improvements were across the board. February shipments rose compared to January for electronic components, computer and office equipment, telecommunications and instruments and controls by 4.9%, 9.7%, 20.5% and 4.5%, respectively. New orders were up 4.3%, 15.7%, 2.6% and 14%, respectively.

While the rise is stronger than many industry watchers expected, caution is still the watchword. And for good reason. The book-to-bill ratio for computer and office equipment — a leading indicator for the industry — was below one for the third consecutive month. Backlogs fell to $12.4 billion, 6% below February 1989, while both inventory levels and production rates slipped.

The upside for the computer segment is that inventories now appear to be under control. Days of inventory continued to fall in February while orders to inventory rose. Likewise, backlog to inventory continued to advance in February from its low point last August.

BRUCE C.P. RAYNER

Look to your sales, lads; raise your margins!

The electronics industry weathered choppy markets and sinking margins in 1989. Even the most profitable have seen their sales trimmed

BY BRUCE C.P. RAYNER and LINDA STALLMANN

Nineteen eighty-nine was a year of rough weather for the bottom line at U.S. electronics companies. On average, total electronics industry profits were down compared with previous years. Even top performers reported sinking profits.

The ELECTRONIC BUSINESS 100, a list of the industry's most profitable public companies, posted a weighted average after-tax profit margin of just 7.1% in 1989, down from an 8.7% margin in 1988. Total profits declined by $1.9 billion for the top 100 this year compared with 1988's level, a drop of 12.4%.

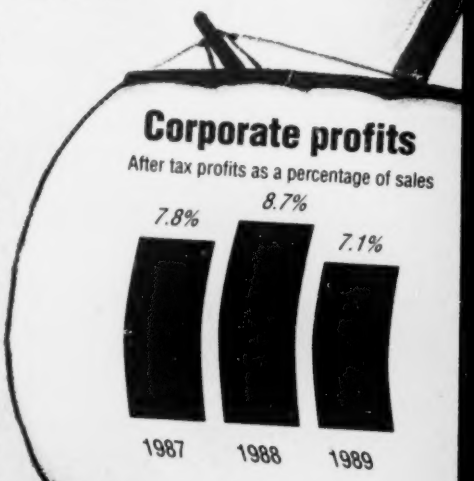
In all, only 28 companies reported profit rates of more than 10% in 1989 down from 30 in 1988. The overall drop in profits was the result of slowing sales, pricing pressures and corporate restructurings.

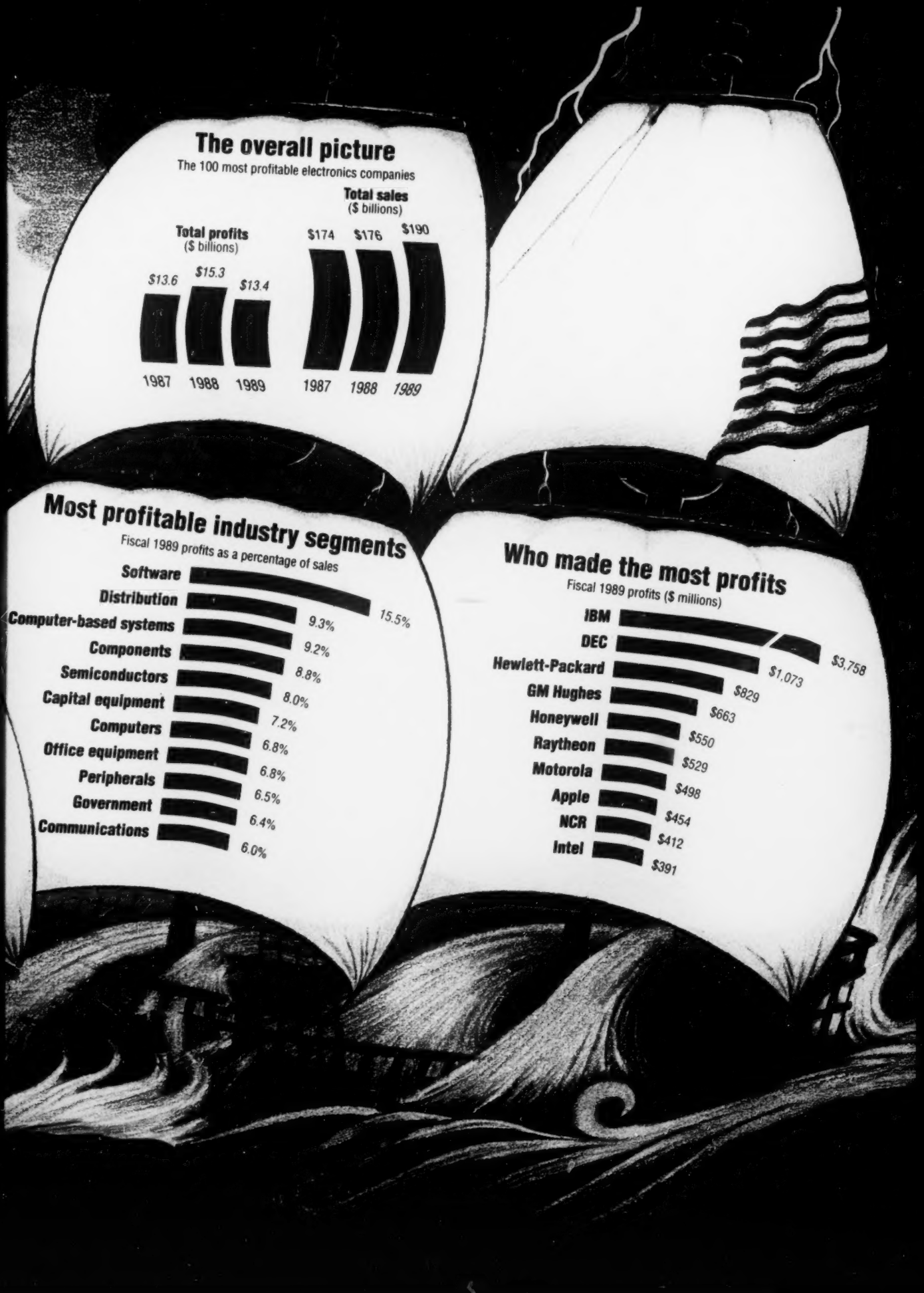
Topping this year's list of most profitable companies for the second consecutive year was Micron Technology Inc. With a profit margin of 23.8%, the Boise, Idaho, company proved once again that there is money to be made in dynamic RAMs. Still, Micron was not immune from the drop in DRAM prices last year. The company's profit margin slid from a far healthier 32% of sales in 1988 as DRAM prices fell by one-fifth.

Which group came in first overall? Software. When it comes to consistent profit performance, nothing touches the software industry. Software's average profit margin for the year was a healthy 16%, up from its leading position of 14.7% in 1988. Microsoft Corp. ranked second overall with a profit margin of 21.2% up slightly from the previous year. Still, not all software companies prospered. Ashton-Tate Corp. dropped off the list as a result of a disastrous financial year.

In terms of sheer size of the bottom line, IBM still reigns supreme. With a $3.758 billion total net profit, IBM outpaced second placed Digital Equipment Corp. by a factor of three. But both DEC and IBM saw lower profit margins in 1989: IBM's margin fell to 6.0% from 9.2%; DEC's slipped from 11.4% to 8.4%. The reasons for both: slower sales and corporate restructuring.

As for this year, don't expect much of an improvement in the bottom line. With poor sales growth in the early part of the year and lackluster forecasts for the rest of 1990, profitability is expected to remain in the doldrums. □




The overall picture
The 100 most profitable electronics companies
Total profits
($ billions)
$13.6
$15.3
$13.4
1987
1988
1989
Total sales
($ billions)
$174
$176
$190
1987
1988
1989
Most profitable industry segments
Fiscal 1989 profits as a percentage of sales
Software
15.5%
Distribution
9.3%
Computer-based systems
9.2%
Components
8.8%
Semiconductors
8.0%
Capital equipment
7.2%
Computers
6.8%
Office equipment
6.8%
Peripherals
6.5%
Government
6.4%
Communications
6.0%
Who made the most profits
Fiscal 1989 profits ($ millions)
IBM
$3,758
DEC
$1,073
Hewlett-Packard
$829
GM Hughes
$663
Honeywell
$550
Raytheon
$529
Motorola
$498
Apple
$454
NCR
$412
Intel
$391

Most profitable companies

Rank	Company	Profit as a percentage of sales	Fiscal year 1989 sales ($ millions)	Fiscal year 1989 profits ($ millions)	Fiscal year ended	Location
1	[illegible]	23.8%	$446.4	$106.1	6/89	Boise, Idaho
2	[illegible]	21.2%	803.5	170.5	6/89	Redmond, Wash.
3	[illegible]	19.4%	142.8	27.8	12/89	Santa Clara, Calif.
4	[illegible]	15.9%	1,030.2	163.5	3/89	Garden City, N.Y.
5	[illegible]	15.4%	199.3	30.7	12/89	San Jose, Calif.
6	Chips and Technologies	15.2%	217.6	33.0	6/89	San Jose, Calif.
7	Measurex	14.3%	285.3	40.7	11/89	Cupertino, Calif.
8	Oracle Systems	14.0%	583.7	81.8	5/89	Belmont, Calif.
9	Octel Communications	13.5%	87.2	11.8	6/89	Milpitas, Calif.
10	Medtronic	13.1%	741.7	97.4	4/89	Minneapolis, Minn.
11	[illegible]	12.5%	3,126.8	391.0	12/89	Santa Clara, Calif.
12	[illegible]	12.2%	556.0	68.0	12/89	Cambridge, Mass.
13	[illegible]	12.0%	144.8	17.3	12/89	Minneapolis, Minn.
14	[illegible]	11.9%	137.4	16.3	6/89	Los Angeles, Calif.
15	[illegible]	11.8%	380.0	44.8	12/89	Beaverton, Ore.
16	Premier Industrial	11.7%	596.1	69.7	5/89	Cleveland, Ohio
17	Network Equipment Technologies	11.7%	136.7	16.0	3/89	Redwood City, Calif.
18	Compaq Computer	11.6%	2,876.1	333.3	12/89	Houston, Texas
19	Novell	11.5%	421.9	48.5	10/89	Provo, Utah
20	Cray Research	11.3%	784.7	89.0	12/89	Minneapolis, Minn.
21	[illegible]	11.1%	150.9	16.7	5/89	Deerfield Beach, Fla.
22	[illegible]	11.0%	299.3	32.9	4/89	South Windsor, Conn.
23	[illegible]	10.4%	341.3	35.4	12/89	Marlborough, Mass.
24	[illegible]	10.3%	501.8	51.5	10/89	Santa Clara, Calif.
25	[illegible]	10.3%	109.0	11.2	12/89	Roy, Utah
26	Molex	10.1%	571.9	57.7	6/89	Lisle, Ill.
27	AMP	10.0%	2,797.0	281.0	12/89	Harrisburg, Pa.
28	Analogic	10.0%	144.9	14.5	7/89	Peabody, Mass.
29	Integrated Device Technology	9.9%	180.7	17.9	3/89	Santa Clara, Calif.
30	Sequent Computer Systems	9.5%	145.6	13.8	12/89	Beaverton, Ore.
31	[illegible]	9.5%	247.7	23.5	6/89	Everett, Wash.
32	[illegible]	9.3%	159.6	14.9	3/89	Akron, Ohio
33	[illegible]	9.2%	860.1	79.5	12/89	Huntsville, Ala.
34	[illegible]	9.1%	206.8	18.9	8/89	Little Rock, Ark.
35	[illegible]	9.1%	2,959.6	269.3	12/89	Minneapolis, Minn.
36	Emulex	8.9%	148.7	13.3	6/89	Costa Mesa, Calif.
37	3Com	8.9%	385.9	34.3	5/89	Santa Clara, Calif.
38	Apple Computer	8.6%	5,284.0	454.0	9/89	Cupertino, Calif.
39	Symbol Technologies	8.5%	222.3	19.0	12/89	Bohemia, N.Y.
40	Digital Communications Assoc.	8.5%	208.2	17.7	6/89	Alpharetta, Ga.
41	[illegible]	8.4%	181.4	15.2	6/89	Costa Mesa, Calif.
42	[illegible]	8.4%	12,742.0	1,073.0	6/89	Maynard, Mass.
43	[illegible]	8.4%	199.4	16.8	10/89	Bloomington, Minn.
44	[illegible]	8.1%	103.5	8.4	9/89	Mountain View, Calif.
45	[illegible]	8.0%	469.7	37.5	12/89	Plano, Texas
46	Tandy	7.7%	4,180.7	323.5	6/89	Fort Worth, Texas
47	Diebold	7.7%	468.9	36.2	12/89	Canton, Ohio
48	Electro Scientific Industries	7.6%	83.1	6.3	5/89	Portland, Ore.
49	Richardson Electronics	7.6%	156.6	11.9	5/89	LaFox, Ill.
50	BTU International	7.3%	101.2	7.4	12/89	North Billerica, Mass.

[illegible] (Continued)

Most profitable companies

Rank	Company	Profit as a percentage of sales	Fiscal year 1989 sales ($ millions)	Fiscal year 1989 profits ($ millions)	Fiscal year ended	Location
51	[illegible]	7.3%	$171.1	[illegible]	[illegible]	San Jose, Calif.
52	[illegible]	7.3%	2,101.1	153.0	12/89	Sunnyvale, Calif.
53	[illegible]	7.2%	152.8	11.1	9/89	Eden Prairie, Minn.
54	[illegible]	7.2%	1,632.5	118.3	9/89	Cupertino, Calif.
55	[illegible]	7.2%	186.3	13.5	[illegible]	Mountain View, Calif.
56	Convex Computer	7.2%	158.6	11.5	12/89	Richardson, Texas
57	KLA Instruments	7.1%	165.5	11.7	6/89	Santa Clara, Calif.
58	Hewlett-Packard	7.0%	11,899.0	829.0	10/89	Palo Alto, Calif.
59	Rexon	6.9%	146.8	10.2	9/89	Culver City, Calif.
60	NCR	6.9%	5,956.0	412.0	12/89	Dayton, Ohio
61	[illegible]	6.9%	101.9	7.0	12/89	Sunnyvale, Calif.
62	[illegible]	6.6%	546.8	36.3	6/89	Atlanta, Ga.
63	[illegible]	6.6%	1,304.7	85.5	2/89	New York, N.Y.
64	[illegible]	6.3%	2,875.7	180.1	12/89	Stamford, Conn.
65	[illegible]	6.2%	123.5	7.7	[illegible]	Dallas, Texas
66	Quantum	6.2%	208.0	12.9	3/89	Milpitas, Calif.
67	Analog Devices	6.1%	453.4	27.9	10/89	Norwood, Mass.
68	Intermec	6.1%	131.1	8.0	3/89	Lynnwood, Wash.
69	Arix	6.1%	85.0	5.2	6/89	San Jose, Calif.
70	Kulicke & Soffa Industries	6.0%	96.5	5.8	9/89	Willow Grove, Pa.
71	[illegible]	6.0%	310.7	18.7	12/89	Palo Alto, Calif.
72	[illegible]	6.0%	8,795.0	528.0	12/89	Lexington, Mass.
73	[illegible]	6.0%	62,710.0	3,758.0	12/89	Armonk, N.Y.
74	[illegible]	5.9%	704.9	41.4	12/89	San Jose, Calif.
75	[illegible]	5.8%	11,359.0	659.2	12/89	Detroit, Mich.
76	Aydin	5.8%	157.5	9.2	12/89	Horsham, Pa.
77	Valid Logic Systems	5.8%	173.9	10.0	12/89	San Jose, Calif.
78	Everex Systems	5.6%	377.3	21.3	7/89	Fremont, Calif.
79	Cipher Data Products	5.6%	217.8	12.2	6/89	San Diego, Calif.
80	CTS	5.4%	262.0	14.3	12/88	Elkhart, Ind.
81	[illegible]	5.4%	361.9	19.5	6/89	Orland Park, Ill.
82	[illegible]	5.2%	2,213.6	116.2	6/89	Melbourne, Fla.
83	[illegible]	5.2%	146.9	7.6	2/89	Lake Success, N.Y.
84	[illegible]	5.2%	8,320.0	433.0	12/89	Schaumburg, Ill.
85	[illegible]	5.1%	169.5	8.7	[illegible]	Tucson, Ariz.
86	E-Systems	5.1%	1,626.4	83.0	12/89	Dallas, Texas
87	Loral	5.1%	1,187.0	60.3	3/89	New York, N.Y.
88	Cubic	5.0%	349.4	17.6	9/89	San Diego, Calif.
89	Anthem Electronics	4.9%	319.0	15.8	12/89	San Jose, Calif.
90	Augat	4.9%	306.6	14.9	12/89	Mansfield, Mass.
91	[illegible]	4.7%	91.3	4.3	[illegible]	[illegible], Texas
92	[illegible]	4.7%	88.7	4.1	[illegible]	Cleveland, Ohio
93	[illegible]	4.7%	393.5	18.6	[illegible]	Burlington, Mass.
94	[illegible]	4.5%	6,521.9	291.7	12/89	Dallas, Texas
95	[illegible]	4.4%	144.2	6.4	[illegible]	[illegible], [illegible]
96	Silicon Graphics	4.4%	263.8	11.5	6/89	Mountain View, Calif.
97	Westmark International	4.3%	438.8	19.1	12/89	Seattle, Wash.
98	Vishay Intertechnology	4.3%	415.6	17.8	12/88	Malvern, Pa.
99	Coherent	4.2%	201.6	8.6	9/89	Palo Alto, Calif.
100	Logicon	4.2%	231.4	9.6	3/89	Torrance, Calif.

Most profitable companies by industry segment

Capital equipment

	Profit as a percentage of sales	1989 rank
Gerber Scientific	11.0%	22
Applied Materials	10.3%	24
Fluke	9.3%	31
BTU Int'l	7.3%	50
Silicon Valley Group	7.3%	51
MTS Systems	7.2%	53
KLA Instruments	7.1%	57
Hewlett-Packard	7.0%	58
Kulicke & Soffa	6.0%	70
Keithley Instruments	4.7%	92
Weighted average	**7.2%**	

Computers

	Profit as a percentage of sales	1989 rank
Teradata	11.9%	14
Compaq Computer	11.6%	18
Cray Research	11.3%	20
Stratus Computer	10.4%	23
Sequent Computer	9.5%	30
Apple Computer	8.6%	38
Digital Equipment	8.4%	42
Pyramid Technology	8.1%	44
Tandy	7.7%	46
Amdahl	7.3%	52
Tandem Computers	7.2%	54
Convex Computer	7.2%	56
Rexon	6.9%	59
MIPS Computer Systems	6.9%	61
Arix	6.1%	69
IBM	6.0%	73
Silicon Graphics	4.4%	96
Weighted average	**6.8%**	

Computer-based systems

	Profit as a percentage of sales	1989 rank
Measurex	14.3%	7
Mentor Graphics	11.8%	15
Tekton	9.3%	32
Intergraph	9.2%	33
Symbol Technologies	8.5%	39
Electro Scientific	7.6%	48
ASK Computer Systems	7.2%	55
BancTec	6.2%	65
Valid Logic Systems	5.8%	77
Coherent	4.2%	99
Weighted average	**8.2%**	

Communications

	Profit as a percentage of sales	1989 rank
Octel Communications	13.5%	9
Network Systems	12.0%	13
Network Equipment Technologies	11.7%	17
Novell	11.5%	19
3Com	8.9%	37
Digital Communications	8.5%	40
ADC Telecommunications	8.4%	43
DSC Communications	8.0%	45
Scientific-Atlanta	6.6%	62
General Instrument	6.6%	63
Andrew	5.4%	81
Motorola	5.2%	84
Dynatech	4.7%	93
Weighted average	**6.8%**	

Components (other than semiconductors)

	Profit as a percentage of sales	1989 rank
Molex	10.1%	28
AMP	10.0%	27
CTS	5.4%	80
Augat	4.9%	90
Eldec	4.7%	91
Vishay Intertechnology	4.3%	98
Weighted average	**6.8%**	

Distribution

	Profit as a percentage of sales	1989 rank
Premier Industrial	11.7%	16
Anthem Electronics	4.9%	89
Weighted average	**8.2%**	

Government

	Profit as a percentage of sales	1989 rank
Honeywell	9.1%	35
Watkins-Johnson	6.0%	71
Raytheon	6.0%	72
GM Hughes Electronics	5.8%	75
Aydin	5.8%	76
Harris	5.2%	82
E-Systems	5.1%	86
Loral	5.1%	87
Cubic	5.0%	88
Weighted average	**6.4%**	

Peripherals

	Profit as a percentage of sales	1989 rank
Iomega	10.3%	25
Emulex	8.9%	36
Archive	8.4%	41
Quantum	6.2%	66
Intermec	6.1%	68
Conner Peripherals	5.9%	74
Everex Systems	5.6%	78
Cipher Data Products	5.6%	79
Weighted average	**6.5%**	

Office equipment

	Profit as a percentage of sales	1989 rank
Diebold	7.7%	47
NCR	6.9%	60
Pitney Bowes	6.3%	64
Weighted average	**6.8%**	

Semiconductors

	Profit as a percentage of sales	1989 rank
Micron Technology	23.8%	1
Cypress Semiconductor	15.4%	5
Chips and Technologies	15.2%	6
Intel	12.5%	11
Integrated Device Technology	9.9%	29
Richardson Electronics	7.8%	49
Analog Devices	6.1%	67
Burr-Brown	5.1%	85
Texas Instruments	4.5%	94
Weighted average	**8.8%**	

Software

	Profit as a percentage of sales	1989 rank
Microsoft	21.2%	2
Cadence Design Systems	19.4%	3
Computer Associates International	15.9%	4
Oracle Systems	14.0%	8
Lotus Development	12.2%	12
Systematics	9.1%	34
Informix	4.4%	95
Weighted average	**15.8%**	

Net profits are from continuing operations after taxes and before extraordinary items.

Source: ELECTRONIC BUSINESS

Who are the movers and shakers of the venture capital money tree?

The new-venture shakeout is ending. Now a cooler and calmer investor community is on the lookout for companies with long-term winning strategies

Venture capitalists are on the prowl again. But in an apparent return to common sense, cooler heads appear to be in control this time. Unlike the mid-to-late 1980s when cash-laden investors seemed to be more interested in spending money than in growing solid new businesses, the search now is far more focused. The targets: sound, well-managed technology companies that stand a good chance of scoring big in the fickle initial public offering market.

"Funds without a specific focus and strategy are going to find existence increasingly difficult," says Peter Wendell, Sierra Ventures in Menlo Park, Calif. "You're going to have to make your bed and lie in it for a long time."

To their regret, that is exactly what many investors have learned the hard way over the past five years or so. One factor in the venture capital shakeout of the late '80s was the white-hot competition for deals, which drove prices up and forced too many investors to make too many snap decisions. But another was the seemingly hostile (or at least disinterested) public reception to technology issues in general. Whereas the Standard & Poor's stock market index rose more than 100% between 1983 and 1990, the Hambrecht & Quist Index of technology stocks fell by about 12% during the same period.

Spurred by such recent success stories as that of drive-maker Exabyte Corp. of Boulder, Colo., which produced a twenty-fold return for Institutional Venture Partners when Exabyte went public last October, today's investors are decidedly more lively. As illustrated by the following exclusive ELECTRONIC BUSINESS venture capital directory, electronics and telecommunications companies are still heavily favored by most firms. Many managers report that the electronics industry now accounts for more than half their total funds.

H. GARRETT DeYOUNG, XIONG XIOAGE

Where the money goes and grows in venture capital

Results of the ELECTRONIC BUSINESS survey of venture capitalists that serve the electronics industry

Firm/Address	Contact	Telephone	Total paid-in capital ($ millions)	1989 figures: Dollar investment ($ millions) Total	Electronics	Number of companies invested in: Total	Electronics
Accel Partners One Palmer Square, Princeton, N.J. 08542	Don H. Fuller	(609) 683-4500	$117	$210	$176	51	43
Alex Brown & Sons 135 East Baltimore Drive, Baltimore, Md. 21202	Molly Hogan	(301) 727-1700	NA	NA	NA	NA	NA
Asset Management 2275 East Bayshore Road, Palo Alto, Calif. 94303	Any Partner	(415) 494-7400	$100	$93	$23	58	23
BancBoston Ventures 100 Federal Street, Boston, Mass. 02110	Manuel Henriquez	(617) 434-6911	$30	$30	$4	41	8
Battery Ventures 200 Portland Street, Boston, Mass. 02114	Richard D. Frisbie	(617) 367-1011	$75	$40	$40	30	30
Brentwood Associates 11661 San Vicente Blvd., Suite 707, Los Angeles, Calif. 90049	G. Bradford Jones	(213) 826-6581	$483	$294	$200	50	35
Burr, Egan, Deleage & Co. One Post Office Square, Suite 3800, Boston, Mass. 02109	Jonathan A. Flint	(617) 482-8020	$450	$300	$102	123	2
Canaan Venture Partners 105 Rowayton Avenue, Rowayton, Conn. 06853	Jim Fitzpatrick	(203) 855-0400	$140	$60	$12	8	2

(Continued)

Christopher Bing

Where the money goes and grows in venture capital

Results of the ELECTRONIC BUSINESS survey of venture capitalists that serve the electronics industry

Company/address	Contact	Telephone	Total paid-in capital ($ millions)	1989 figures: Dollar investment ($ millions) Total	Electronics	Number of companies invested in: Total	Electronics
Charles River Ventures 67 Battery March Street, Boston, Mass. 02110	Marc Friend	(617) 439-0477	$152	$140	$97	45	31
Charter Venture Capital 525 University Avenue, Suite 1500, Palo Alto, Calif. 95301	A. Barr Dolan	(415) 325-6953	NA	NA	NA	30	15
Chatham Venture 420 Bedford Street, Lexington, Mass. 02173	Euan Malcolmson	(617) 863-0970	$24	$27	$27	10	10
Citicorp Venture Capital 153 East 53rd Street, 5th Floor, New York, N.Y. 10043	Tom Darling	(212) 559-1239	NA	NA	NA	NA	NA
Cornerstone Management 2420 Sand Hill Rd. Suite 202, Menlo Park, Calif. 94025	Barbara Anderson	(415) 854-2576	$37	$18	$8	37	30
Crosspoint Venture Partners One First Street, Los Altos, Calif. 94022	William P. Cargile	(415) 948-8300	$120	$70	$45	50	28
Dajen Consulting 9 Lundy Lane, Larchmont, N.Y. 10538	Robert Cohen	(201) 947-4945	NA	NA	NA	1	1
Dougery, Wilder & Howard 2003 Landings Drive, Mountain View, Calif. 94043	John R. Dougery	(415) 968-4820	$130	$130	$100	60	48
Eastech Management 260 Franklin Street, Suite 530, Boston, Mass. 02110	Michael H. Shanahan	(617) 439-6130	$34	$27	$26	20	19
Fairfield Venture Partners 1275 Summer Street, Stamford, Conn. 06905	Oakes Ames	(203) 358-0255	$100	$70	$35	40	20
Fidelity Ventures 82 Devonshire Street L7A, Boston, Mass. 02109	William R. Elfers	(617) 570-5200	$180	$86	$8	3	0
First Century Partners 1345 Avenue of the Americas, New York, N.Y. 10105	Lisa Roumell	(212) 698-3634	$122	$75	$35	35	5
Geocapital Partners 2115 Linwood Avenue, Fort Lee, N.J. 07024	Stephen J. Clearman	(201) 461-9292	$45	$24	$22	20	17
Grace Ventures 20300 Stevens Creek Blvd., Suite 330, Cupertino, Calif. 95014	Robert E. Pedigo	(408) 725-0774	$70	$48	$25	49	25
Hancock Venture Capital One Financial Center, Boston, Mass. 02111	Ofer Nemirovsky	(617) 350-4002	$750	$600	$240	200	NA
Hambrecht & Quist 235 Montgomery Street, San Francisco, Calif. 94104	Marti Wyman	(415) 576-3300	NA	NA	NA	NA	NA
Hambro International Venture Fund 17 East 71st Street, New York, N.Y. 10021	Julie Lane	(212) 288-7778	$150	$110	$37	82	27
Highland Capital Partners One International Place, Boston, Mass. 02110	Paul A. Maeder	(617) 330-8765	$77	$21	$12	10	3
Idanta Partners 10975 Torreyana Road, Suite 304, San Diego, Calif. 92122	David J. Dunn	(619) 452-9690	$80	$65	$50	2	2
Indosuez Ventures 3000 Sand Hill Road, Bldg. 2-160, Menlo Park, Calif. 94025	David E. Gold	(415) 854-0587	$34	$19	$14	25	19
InterWest Partners 3000 Sand Hill Road, Bldg. 3-255, Menlo Park, Calif. 94025	Therese J. Kollerer	(415) 854-8585	$200	$260	NA	NA	NA
Kleiner Perkins Caufield & Byers Four Embarcadero Center, Suite 3520, San Francisco, Calif. 94111	Brook H. Byers	(415) 421-3110	NA	NA	NA	NA	NA
Lawrence, Tyrrell, Ortale & Smith 515 Madison Avenue, New York, N.Y. 10022	Brian Horey	(212) 826-9080	$55	$68	$20	33	10
Mayfield Fund 2200 Sand Hill Road, Menlo Park, Calif. 94025	Andrew K. Klatt	(415) 854-5560	$248	$370	NA	68	44
Menlo Ventures 3000 Sand Hill Road, Bldg. 4-100, Menlo Park, Calif. 94025	H.D. Montgomery	(415) 854-8540	$285	$140	$30	45	9
Mohr, Davidow Ventures 3000 Sand Hill Road, Bldg. 1-240, Menlo Park, Calif. 94025	Michael E. Sears	(415) 854-7236	$80	$27	$6	29	7
Montgomery Securities 600 Montgomery Street, San Francisco, Calif. 94111	Paul F. Denning	(415) 627-2000	NA	NA	NA	NA	NA

(Continued)

Where the money goes and grows in venture capital

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Morgan, Holland Ventures One Liberty Square, Boston, Mass. 02109	Joseph T. McCullen	(617) 423-2300	$100	$45	$23	22	11
Morgenthaler Ventures 700 National City Bank Bldg., 629 Euclid Avenue, Cleveland, Ohio 44114	T.A. Laufik	(216) 621-3070	$160	$59	$20	44	8
New England Capital One Washington Mall, Boston, Mass. 02108	Tom Tremblay	(617) 573-6400	$20	NA	NA	59	9
New Enterprise Associates 1119 St. Paul Street, Baltimore, Md. 21202	Nancy Dorman	(301) 244-0115	$400	NA	$100	130	33
Oak Investment Partners One Gorham Island, Westport, Conn. 06880	Michele A. Cassidy	(203) 226-8346	$340	$281	$235	38	30
Paragon Venture Partners 3000 Sand Hill Road, Bldg. 2-190, Menlo Park, Calif. 94025	Robert F. Kibble	(415) 854-8000	$70	$33	$26	21	13
Pathfinder Venture Capital Funds 7300 Metro Boulevard, Suite 585, Minneapolis, Minn. 55435	Brian P. Johnson	(612) 835-1121	$88	$50	$25	52	21
Raytheon Ventures 141 Spring Street, Lexington, Mass. 02173	Clyde E. Rettig	(617) 860-2274	NA	$27	$16	15	7
RFE Investment Partners 36 Grove Street, New Canaan, Conn. 06840	Hunter Reichert	(203) 966-2800	$210	$210	NA	42	4
Robertson, Colman & Stephens One Embarcadero Center, Suite 3100, San Francisco, Calif. 94111	R. Lee Douglas	(415) 781-9700	$150	$15	$4	61	32
L.F. Rothschild 222 Broadway, New York, N.Y. 10038	Any partner	(212) 238-2000	NA	NA	NA	NA	NA
Shaw Venture Partners 111 Southwest Fifth Avenue, Suite 2200, Portland, Ore. 97204	Alan S. Dishlip	(503) 228-4884	$50	$26	$22	25	21
Sigma Partners 2099 Gateway Place, Suite 310, San Jose, Calif. 95110	Lawrence G. Finch	(408) 453-9300	$120	$45	$42	35	33
SRB Management 13455 Noel Road, Dallas, Texas 75240	J.W. Bayless	(214) 702-1100	$130	$90	$85	30	29
Sevin Rosen Management 13455 Noel Road, Suite 1670, Dallas, Texas 75240	Dennis Gorman	(214) 702-1100	$150	$110	$100	60	54
Summit Partners One Boston Place, Boston, Mass. 02108	Bradley O. Greene	(617) 742-5500	$400	NA	NA	39	19
Sutter Hill Ventures 755 Page Hill Road, Suite A-200, Palo Alto, Calif. 94306	Paul M. Wythes	(415) 493-5600	$100	$100	$90	43	39
3i Ventures 99 High Street, Suite 1350, Boston, Mass., 02116	Allane R. Ferquson	(617) 542-8560	$200	$74	$37	68	34
TA Associates 45 Milk Street, Boston, Mass. 02109	Janet Jordan	(617) 574-6796	$598	$266	$187	78	61
Technology Venture Investors 3000 Sand Hill Road, Bldg. 4-210, Menlo Park, Calif. 94025	Mark G. Wilson	(415) 854-7472	$170	$260	$245	50	48
Trinity Ventures 155 Bovet Road, Suite 700, San Mateo, Calif. 94402	Noel J. Fenton	(415) 358-9700	$65	$29	$17	28	14
TVM Techno Venture Management 45 Milk Street, Boston, Mass. 02109	Waldemar Jantz	(617) 574-6706	$200	$100	$40	85	34
Vencon Management 301 West 53rd Street, New York, N.Y. 10019	Irvin Barash	(212) 581-8787	NA	$15	$10	NA	NA
Venture Capital Fund of New England 160 Federal Street, 23rd Floor, Boston, Mass. 02110	Kevin J. Dougherty	(617) 439-4646	$40	$21	$7	35	13
Venture Funding Group 49 West 12th Street, Executive Suite, New York, N.Y. 10011	Allan E. Skora	(212) 691-9895	NA	$11	$7	10	7
E.M. Warburg, Pincus & Co. 466 Lexington Avenue, New York, N.Y. 10017	William H. Janeway	(212) 878-4347	$1,772	$1,400	$134	85	18
Woodside Fund 850 Woodside Drive, Woodside, Calif. 94062	Craig L. Davidson	(415) 368-5545	NA	NA	NA	14	4

(Continued)

Which U.S. electronics firms are venture capitalists funding

Results of the ELECTRONIC BUSINESS survey of venture capitalists that serve the electronics industry

Accel Partners: The Santa Cruz Operation, PictureTel, Teleos Communications
BancBoston Ventures: Bipolar Integrated Technology, Xyplex, Hypres
Battery Ventures: Banyan, Marcam, Parallan
Brentwood Associates: Teradata, Cirrus Logic, Synoptics
Burr, Egan, Deleage & Co.: Cadre Technologies, Pacific Communications Sciences, Biosym

Canaan Venture Partners: Multiflow Computers, Anadigics, Comstream
Charles River Ventures: Parametric Technology, Sybase, Chipcom
Charter Venture Capital: Metricom, Interfax, Telebit
Chatham Venture : Banyan, Speech Systems, Language Technology
Cornerstone Management: Stardent Computer, Performance Semiconductor, Digital Microwave

Crosspoint Venture Partners: Photonics, PairGain, STAC
Dajen Consulting Corp.: Islip Transformer & Metal
Dougery, Wilder & Howard: Alantec, Protocol Engines, Vision Systems
Eastech Management Company: Vicor, Aries Technology, Banyan Systems
Fairfield Venture Partners: Cadre Technologies, MRS Technology, Micro Linear

Fidelity Ventures: Banyan, Stardent Computer, Imaging Technology
First Century Partners: Wafer Scale Integration, Iomega, Test System Strategies
Ecocapital Partners: Restor Industries, Polygen, Payment Services
Grace Ventures: Interlink Electronics, Interfax, Ixys
Hancock Venture Capital: Conner Peripherals, Dallas Semiconductor, Filenet

Hambro International Venture Fund: Komag, Edsun, Solectron
Highland Capital Partners: Sybase, Avid Technology, Course Technology
Idanta Partners: Pacific Communication Sciences, Elite Micro Electronics
Indosuez Ventures: Cisco Systems, Alldata, Vertex Design Systems
InterWest Partners: Radius, Xilinx, Network Computing Devices

Lawrence, Tyrrell, Ortale & Smith: Saber Software, Marcam, Viasoft
Mayfield Fund: Silicon Graphics, MIPS Computer Systems, Aspect Telecommunications
Menlo Ventures: SynOptics Communications, Aspect Telecommunications, Syntellect
Moir, Davidow Ventures: MIPS Computer, Auspex Systems, Insite Peripherals
Morgenthaler Ventures: Censtor, Hypres, Verifone

New England Capital: Iris Graphics, Emeral A Systems, MRS Technology
New Enterprise Associates: Dallas Semiconductor, Cirrus Logic, Microwave Technology
Oak Investment Partners: Digital Sound, Parametrics, Sybase
Paragon Venture Partners: SynOptics Communications, Credence Systems, Vantage Analysis Systems
Pathfinder Venture Capital Funds: Digital Systems, Emerald Systems, Confertech International

Raychem Ventures: Bipolar Integrated Technology, Milltech, Schieq Electronics
RFE Investment Partners: Display Technologies, Cortex, Verbex Voice Systems
Robertson, Stephens & Co.: Visix Software, Calera Recognition Systems, Video Telecom
Silver Venture Partners: Actel, Protocol Systems, Sequent Computer Systems
Sigma Partners: MIPS, Veriphone, Novellus Systems

SRB Management Company: Convex Computer, Silicon Graphics, Landmark Graphics
Sevin Rosen Management: Compaq, Lotus Development, Convex Computer, Cypress Semiconductor
Summit Partners: Chips & Technologies, Everex Systems, Fibermux
Sutter Hill Ventures: Weitek, MIPS, Relational Technology
3i Ventures: Evernet Systems, Flavors Technology, Vocollect

TA Associates: Epoch Systems, Broadband Technologies, Netrix
Technology Venture Investors: PraireTek, Dutbound Systems, XA Systems
Trinity Ventures: Vitalink, Alldata, Resonox
TVM Techno Venture Management: Digital Research, Cadre, Novellus
Woodside Fund: SyQuest, Micro Beam, Orion

EC telecom deregulation on hold until U.S. opens up to Europe

What does the small print say in the European Community's telecom ruling? "Buy European." Negotiators say it is a U.S.-market-access bargaining chip

BY LINDA BERNIER

After suffering from a long history of anti-competitive practices, Europe's telecommunications equipment market soon could be injected with a healthy dose of liberalism, thanks to proposed European Community legislation designed to open up several highly restrictive government procurement markets among member nations.

But the directive comes loaded with a potential deal-breaker that would give EC bid preference to European suppliers, a provision which was most likely included in order to pry open U.S. telecom markets.

EC officials responsible for drafting the telecom section of the government procurement directive say they have assurances from the "highest authorities in the Commission" that the EC won't agree to liberalized European market concessions without promises of easier access to U.S. telecom equipment markets.

Now, adds one U.S. trade official, "the hard bargaining begins."

The EC draft directive is intended to be adopted by year-end and implemented by 1993. It would require the EC's government-owned or controlled telephone administrations to open public procurement contracts to competitive bidding — with one glaring loophole that could end up giving preference to European manufacturers anyway.

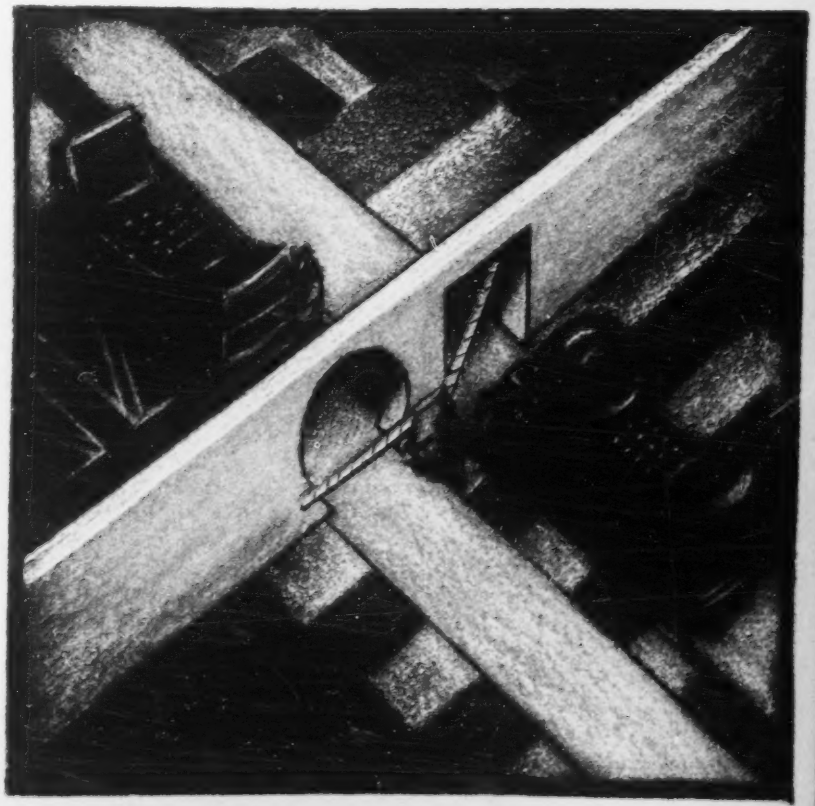
True, when the directive is adopted, the EC's telephone companies won't be allowed to favor national manufacturers as directly as they have in the past. And most U.S. telecom equipment manufacturers welcome the move toward a more liberal market for equipment.

"Buy Europe" clause

But there's a catch: The Europeans have inserted a strong "Buy Europe" clause into the directive that has some Americans hollering "Fortress Europe" from the halls of Congress in Washington to the corridors of the General Agreement on Tariffs and Trade in Geneva. At the GATT, negotiations on this touchy subject suddenly have accelerated now that the EC has a unified position and can negotiate as a bloc.

"The introduction of local content rules and the reinforcement of Community preference rules are a regrettable barrier to what otherwise might be seen as a positive move towards an open competitive single market," according to the position paper of the EC Committee of the American Chamber of Commerce in Belgium, an EC lobby representing 110 European companies of American parentage.

In addition to telecom, the proposed directive covers public procurement in such previously excluded sectors as energy, transport and water. The directive would allow all of those utilities the authority to exclude bids containing less than 50% EC content. For bids with less than 50% EC content, the directive would give preference to EC tenders that do



Bob Dahm

not exceed a 3% price difference over the best non-EC bid. The directive covers telecom equipment valued over $500,000, such as transmission and switching equipment.

The "Buy Europe" clause in the directive is exacerbating already-strained trade relations between the United States and the EC in telecommunications. The directive contributed to the decision of the U.S. Trade Representative to keep the EC on the "priority list" for discriminatory trade practices subject to sanctions under 1988 trade legislation. It is also one of the reasons U.S. officials in March asked the EC for bilateral talks on areas of mutual concern in high technology.

If tension is high, that is because the stakes are high. The United States and Europe are the two largest sectors of the world's $90 billion telecom equipment market, with the EC market growing faster than any other world market, according to the Telecommunications Industry Association (TIA), a U.S. trade group.

U.S. telecom exports to the EC grew almost 90% in the past five years, even with restrictive barriers. "If the European market becomes more accessible, these exports are expected to grow even faster," says Allen R. Frischjorn Jr., TIA president.

U.S. companies criticized

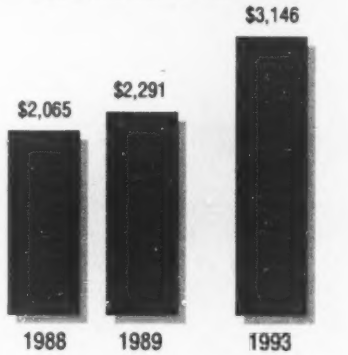
Fundamentally, both Europeans and Americans favor free competition and trade, even in such a strategic sector as telecommunications. But each side differs on how best to guarantee liberal market conditions for such a public utility.

The Europeans accuse U.S. phone companies of engaging in unfair procurement practices. They believe companies such as AT&T and the seven regional Bell operating companies should come under the jurisdiction of the Government Procurement Code being negotiated in the GATT, which would put more teeth into the EC's effort to enforce open competition. The GATT's current Uruguay Round of negotiations is scheduled to be completed at year-end.

The "Buy Europe" clause of their directive, EC officials explain, is merely a safety measure. Officials say if the GATT does not come up with a Government Procurement Code that assures the EC fair access in other markets, or if countries do not become signatories to such a GATT agreement, the Community won't be penalized for its single-market legislation. The draft directive would not apply to signatories of an eventual accord.

Will U.S. suppliers gain from the growth in Europe?

European telecommunications transmission equipment market ($ millions)



Source: Dataquest Inc.

"We don't want to be victims of our own principles," says Walter Grundsteidl, responsible for international relations and EC affairs at Dutch giant N.V. Philips GL, a telecom equipment manufacturer.

The Americans, however, say it is impossible to apply a government procurement code to private companies such as AT&T or the Baby Bells, since that would imply government intervention in private enterprise. Further, the Americans claim that 20 years of Federal Communications Commission (FCC) deregulation, coupled with the divestiture of the Bell operating companies in 1982, has made the U.S. telecom equipment market among the most open in the world.

U.S. telecom imports up

Imports of all types of telecom equipment to the United States reached 18% in 1988, while the United States experienced a $2.6 billion deficit, according the TIA.

"It's ludicrous to say that the U.S. market is closed," says AT&T's Donald Morrison, the Washington-based director of government relations/international. He agreed that much could still be done to achieve "transparency," or more open bidding procedures. But he said that could be best achieved by "regulating the regulators," in this case the FCC.

To do this, "We need to introduce new language into U.S. legislation to guarantee transparency and predictability to European suppliers," adds Morrison.

That's not quite enough for the Europeans. EC officials point out that while non-U.S. manufacturers provide for about 18% of total telecom equipment in the United States, they only provide about 5% of the central office market and 13% of the transmission market, the two key areas affected by restrictive government procurement practices. European suppliers, they add, only comprise 4% of U.S. imports of transmission equipment, the bulk being supplied by Fujitsu Ltd. and NEC.

European telecom equipment makers also complain about the time and money they must spend just to get on the Baby Bells' supplier list. It takes about one to two years, and costs about $15 million in fees, for just one product category, while qualified suppliers in Europe are simply put on a potential suppliers list, according to an EC telecom expert who calls the U.S. procedure a barrier to free trade. "The United States may have started to liberalize its telecommunications market with the breakup of AT&T," he says, "but much more needs to be done."

He adds that if the EC puts its 25 public and private operators, including the privatized (or perhaps semi-privatized) British Telecommunications plc on the negotiating table, there is no reason why the United States shouldn't put the seven Baby Bells on the table.

EC officials also note that there is no reason for the United States to get so concerned about local content or preference rules. Many U.S. government procurement agencies have "buy American" clauses granting preference rules to U.S. suppliers that do not exceed a 6% price difference over the best non-American bid.

In fact, U.S. trade officials in Brussels and Geneva admit that the EC is willing to change the contentious "Buy European" clauses in its government procurement directive in exchange for access to some currently restricted local and state procurement markets. Any talks along those lines would have to conclude by year-end. □

Microcontroller makers drive off down different roads

With performance requirements for automobiles increasing, microcontroller manufacturers are employing varied, niche-oriented strategies to gain market share

BY GIUSEPPE LABIANCA

Semiconductor manufacturers are scrambling in different directions in their efforts to gain a greater share of the automotive market for microcontrollers (MCUs). Increasing performance requirements, particularly in engine control and anti-lock braking systems, are creating more demand for high-end devices. A few years ago only 4- and 8-bit microcontrollers were available. Now designers are looking at 16- and 32-bit MCUs.

In addition to engine control, "there are two to four sockets in the typical car, and over the next six to 10 years over 15 other sockets will be added," says Mike Polen, microcontroller marketing manager for Texas Instruments Inc.'s Semiconductor Group in Houston. National Semiconductor Corp. sees MCU use by the Big Three (General Motors, Ford and Chrysler) growing to $278 million in 1991, nearly double the $152 million figure for 1988.

The worldwide automotive embedded control market in 1989 was $507 million, according to Market Intelligence Research Co. (MIRC) of Mountain View, Calif., and is expected to reach more than $1 billion by 1995. MIRC anticipates a relatively stable annual growth rate of 12.2% until 1995. Motorola Inc. is the leader in the North American merchant automotive electronics market with a 24% market share, followed by National, Intel Corp. and TI, according to market research company Dataquest Inc.

The automotive electronics arena encompasses six market segments: powertrain, safety/comfort/convenience, vehicle controls, driver information, entertainment and body (power windows/roofs). Half of the $2.1 billion automotive electronics market last year went to powertrain applications, which include engine/transmission control, according to MIRC. But the powertrain segment is maturing and growth has been slowing. Virtually every automobile sold in North America already has an engine controller.

Motorola and Intel dominate the engine control segment. Motorola supplies General Motors and Chrysler with 8-bit MCUs for engine control, while Intel supplies a 16-bit MCU for Ford's engines.

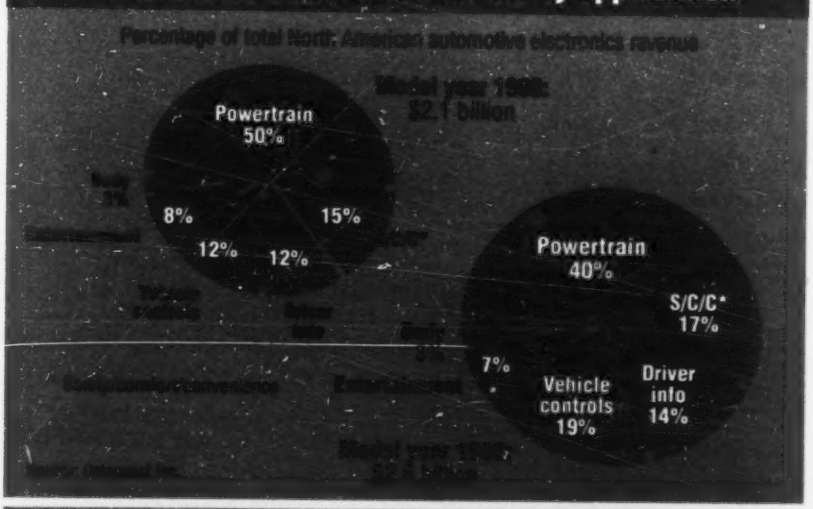
Little room for competitors

Competitors realize it is nearly impossible to wrest control of this segment away from Motorola and Intel. TI's Polen notes that General Motors, Ford and Chrysler "are looking ahead to their next generation, and they are not intending to change vendors for that one socket." Adds Fred Phail, strategic marketing manager for Intel's automotive division in Chandler, Ariz.: "Typically engine control has been a 15-year investment for an automotive company because of substantial investment in software, test equipment and manufacturing equipment."

Federal legislation on fuel economy and emission control has driven manufacturers to introduce higher performance hardware for engine control. Motorola developed the world's first 32-bit MCU, the 68332, in conjunction with GM's captive supplier, Delco Electronics Corp., in April 1989. This MCU is scheduled to be used as an engine controller in high-end GM cars beginning with the 1994 model year.

In an unusual move, Motorola leap-frogged the entire 16-bit market,

Automotive electronics market by application



going directly from an 8-bit to a 32-bit MCU. But industry insiders question that strategy. They don't believe a 32-bit MCU will even be necessary within the next five years. Instead, analysts and industry observers see a great deal of potential in the 16-bit market.

But Motorola thinks otherwise. Steve Marsh, director of marketing for Motorola's MCU division in Austin, Texas, says Motorola believes the 16-bit MCU marketplace is vulnerable on two fronts — to speed enhancements of its 8-bit MCU on the low end and to pricing strategies of its 32-bit MCU on the high end. "I anticipate that the 32-bit machine will be very popular in the automotive arena, although the volume will initially be driven by non-automotive industries," he says.

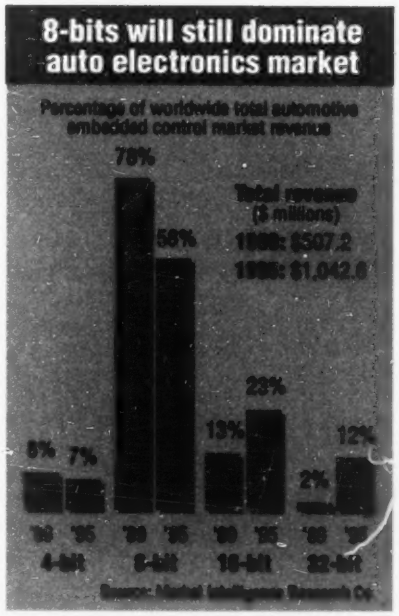
However, Marsh does note that Motorola, in something of a policy reversal, will be entering the 16-bit arena with its own offering sometime later this year.

The 16-bit MCU offers greater future opportunities, says Bill Ribbens, a professor of electrical engineering at the University of Michigan and the main researcher for "Automotive Electronics Delphi V," a report published by the school's Office for the Study of Automotive Transportation. "Sixteen-bit offers so much that I don't know if there is really going to be a need for 32-bit controllers until after 1995," Ribbens says.

One of the bigger problems may be the cost effectiveness of the 32-bit MCU. Myles Kitchen of M.H. Kitchen & Associates, a Santa Clara, Calif., automotive electronics consultant, says, "I don't see the economies of scale bringing the prices of 32-bit MCUs down as fast as they did for the 8- or 16-bit MCU."

16-bit targets

Microcontroller manufacturers already in the 16-bit arena are targeting the vehicle controls segment, which includes anti-lock braking (ABS)/traction control and advanced suspension systems. Vehicle controls will be the fastest growing segment over the next five years, according to Dataquest, and by 1995 it will be second in size only to the powertrain segment. Dataquest predicts that ABS will achieve 50% penetration of the passenger vehicle market by 1995.



National and Intel are heavily involved in the ABS/traction control segment. National's stronghold is in truck ABS, while Intel's is in passenger vehicles. Most anti-lock braking systems today employ 8-bit MCUs, but Intel anticipates that 16-bit controllers will become dominant in this segment by the 1994 model year.

Motorola leap-frogged the entire 16-bit market, going directly to a 32-bit MCU

This migration will occur as manufacturers switch from two-wheel to four-wheel ABS, and then integrate the ABS and traction control.

National also supplies 8- and 16-bit MCUs to this segment. But Mike Caldwell, National's microcontroller marketing manager in Santa Clara, Calif., says he doesn't believe this migration will happen by 1994. Although Caldwell agrees it will eventually occur, he does not see 16-bit overtaking 8-bit so soon because of the four-year design cycle for ABS systems.

Active suspension is another vehicle control application that will likely require a 16-bit MCU. TI has gone aggressively into the faster digital signal processors (DSPs) required for active suspension control. But "Automotive Electronics Delphi V" projects that active suspension will have a market penetration of only 20% by 1995. In fact, General Motors canceled the fully active suspension on its 1991 Corvette in February because of the prohibitive cost. Although the DSPs can also be used for engine control and ABS/traction control, it will be difficult for TI to win designs in those areas because of the domination by Motorola, National and Intel.

Low end

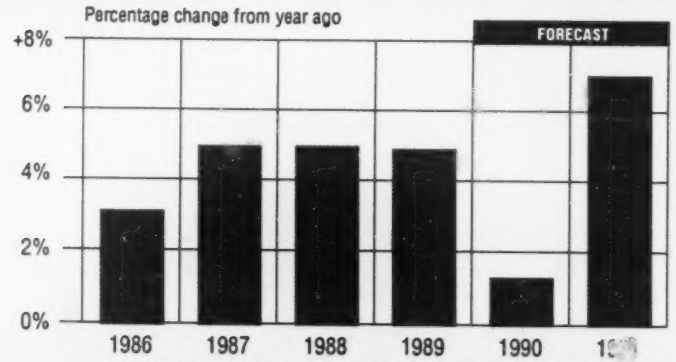
Although the 8-bit market will make up a smaller share of the total automotive market for embedded control by 1995, it will still maintain the highest percentage of revenue, according to MIRC. Most applications other than engine control and ABS/traction control will use 8-bit MCUs. These applications include door locks, power seat control, radios, lights and climate control. TI's Polen points out that "today many of those applications are still mechanical or electromechanical and the need to go to anything more than an 8-bit processor is highly unlikely, even if you pull lots of them together."

Industry executives agree that the 8-bit market will remain much larger than either the 16- or 32-bit market over the next 10 years. The 8-bit arena is hotly contested, with all players having numerous product offerings.

The 4-bit MCU is at the lowest end of the market, with total 1989 revenue of $40 million, according to MIRC. It is projected to remain a small, slow-growth portion of the total market. In fact, some major manufacturers have never supplied a 4-bit MCU for the automotive market. Yet National, the leading 4-bit manufacturer, is still targeting this market.

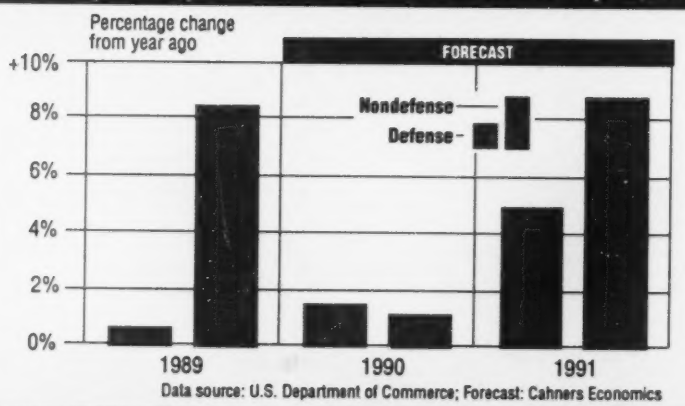
New applications that replace mechanical or electromechanical devices are being added, National's Caldwell says, and some do not need the performance of an 8-bit machine. "I don't see the 4-bit market dying," he says. "Almost every year they have the going-out-of-business sale on 4-bits. This has been going on for eight years now. But there are still users who are moving into 4-bit." □

Communications equipment shipments slow



Data source: U.S. Department of Commerce; Forecast: Cahners Economics

Defense vs. nondefense communications shipments



Data source: U.S. Department of Commerce; Forecast: Cahners Economics

Shipments of selected communication products

($ millions)	1988	1987	Change
Telephone equipment	**$16,181.5**	**$15,886.6**	**1.9%**
Telephone switching and switchboard	7,067.7	7,367.1	-4.1%
Central office	4,612.0	4,550.4	1.4%
Private branch exchange	1,009.4	1,412.3	-28.5%
Carrier line equipment and modems	5,721.2	5,011.6	14.2%
Carrier line	4,512.0	3,720.3	21.3%
Analog	13.3	24.9	-46.6
Digital	225.0	111.2	102.3%
Multiplex	3,270.7	2,560.6	27.7%
Analog	262.3	80.9	224.2%
Digital	3,008.4	2,479.7	21.3%
Modems	1,209.1	1,291.4	-6.4%
Communications equipment	**$14,752.7**	**$13,301.0**	**10.9%**
Communications systems*	12,921.4	11,692.4	10.5%
Microwave	1,598.9	1,370.4	16.7%
Fiber optic	432.2	434.3	-0.4%
Facsimile machines	202.0	108.6	86.0%
Search, detection and navigation	**$31,546.4**	**$30,910.9**	**2.1%**
Light reconnaissance and and electronic surveillance	2,946.4	2,739.9	7.5%
Electronic warfare	11,392.4	10,940.8	4.1%

*Excluding broadcast

Data source: U.S. Department of Commerce

Nondefense telecom shipments remain strong

The strength of the commercial sector is currently driving the communications equipment industry. Even though defense shipments are just eking out some growth from a year ago, shipments for nondefense communications systems remain strong. As a result, for the 12 months ending in February, shipments of total communications equipment reached $79.4 billion — an increase of 6.6% over the prior 12 months.

If past trends are any indication, the surge in usage of high- and low-capacity digital equipment and microwave components is fueling some of this growth. Shipments of high-and low-capacity digital carrier line equipment more than doubled from $111.2 million in 1987 to $225 million in 1988. At the same time, digital multiplex equipment shipments boomed 21% from $2479.7 million to $3008.4 million.

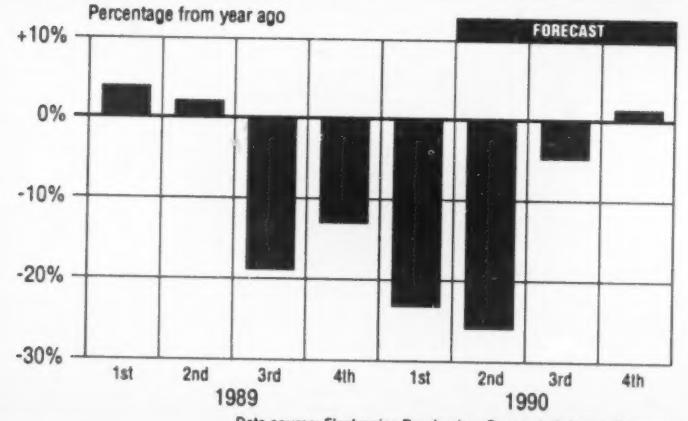
Shipments of communications systems and equipment (excluding broadcast) climbed 10.5%. In particular, U.S. sales of microwave components grew almost 17% from $1.37 billion in 1987 to $1.60 billion in 1988. The strong growth trend is predicted to continue, particularly for digital systems. Market research company Frost & Sullivan of New York estimates that during 1989 through 1993, long-haul common carrier investment in digital microwave equipment will be in the vicinity of 7,000 packages, a value of $1.25 billion. The short-haul investment by common carriers in the same time frame will be 3,400 packages — a total of $127 million.

The Department of Commerce also reported that defense projects in the pipeline translated into increased shipments of search, detection, navigation and guidance systems and equipment, but at a much slower rate than in the mid decade. A total of 249 U.S. companies shipped $31.5 billion worth of this equipment in 1988, up from $30.9 billion in 1987 — a rise of just 2%. Some electronics sectors did better. Shipments of light reconnaissance and surveillance electronic systems and equipment advanced 7.5% in 1988 to $2.95 billion, while shipments of electronic warfare systems expanded 4.1% to reach $11.4 billion.

Cahners Economics expects growth in shipments of defense related communications equipment to remain relatively flat, while rates in the commercial sector will slow a bit later this year and then rebound again in 1991. So, shipments for total communications equipment will rise about 1.3% in 1990 and 7.1% in 1991.

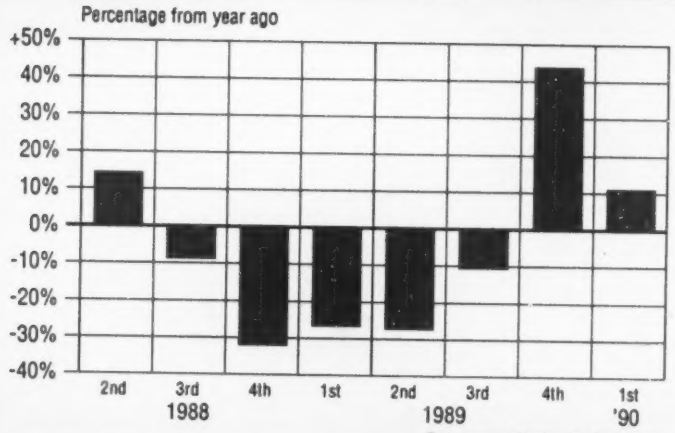
MADELINE FRANCHI, Cahners Economics

Composite electronic component leadtimes



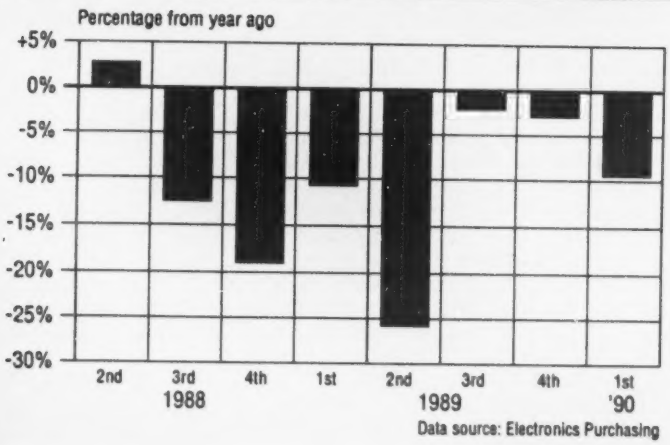
Data source: Electronics Purchasing; Forecast: Cahners Economics

Inventory Strategy Indicator



Data source: Electronics Purchasing

Buying Plans Indicator



Data source: Electronics Purchasing

An industry rebound? Buyers wait and see

If anyone in today's complex business organizations can be said to put their money where their forecast is, it is electronics company buyers. That is why what they say about market conditions is so revealing.

That is also why once a quarter in this column we share with you what ELECTRONIC BUSINESS' sister publication, *Electronics Purchasing*, has gleaned from buyers in its many monthly surveys. Here's what they are saying.

Delivery times for most electronics components — or in the jargon of the buyer's world, "leadtimes" — remained very low in the first three months of 1990. Compared with a year earlier, in fact, composite component leadtimes fell 24%. Since leadtimes for most components, especially the passive devices, had never stretched too far in 1989, this first-quarter signal means the component market is running slack. For buyers, that translates into price concessions. For component makers, they're still waiting for computer demand to fill the void.

Inventory strategy among the U.S. medium and small electronics companies appears to have passed a significant turning point. Through the latter half of 1988 and most of 1989, buyers indicated that, on average, they were paring inventory compared with year-ago levels. According to the *Electronics Purchasing* Inventory Strategy Indicator, buyers suddenly flipped back to building inventories again in the last quarter of 1989 and continued to build stocks in early 1990. One interpretation suggests U.S. equipment makers are stocking up for a rebound. Unfortunately, another interpretation could be they drew inventories down too low in 1989 and are now just compensating.

When asked what they plan to purchase in the next 90 days, the buyers' pessimism of last June has not yet given way to wild-eyed optimism. The *Electronics Purchasing* Buying Plans Indicator fell in the first quarter of 1990 compared with a year ago, but the declines are much smaller now than they were last summer.

Buyers, then, appear to be in a wait-and-see mood. They're getting supplies quickly, building inventory after a summer depletion, but not many purchasing plans are betting on a full-fledged industry upswing just yet.

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